NISTTech

PROCESS FOR MAKING IRIDIUM LAYER

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Abstract

A simple electrochemical process for submonolayer deposition of ultrathin catalytic iridum (Ir) films is demonstrated. The process enables effective utilization of one of nature's rarest elements while different substrates facilitate the exploration of bimetallic catalysis required for a sustainable hydrogen economy. Semi-coherent Ir films were deposited on Au, Pt and Ni substrates using a K3lrCl6-H2S04 electrolyte operated between 40°C and 70°C. However, the deposition reaction is quenched at the onset of H2 production where adsorbed H blocks the reduction of IrCl6-xH20x3-x to Ir. The electrode can be reactivated for further deposition by pulsing the potential to more positive values where adsorbed H is oxidized. The electrocatalytic activity of ultrathin lr and Pt films, and combinations thereof, were examined as function of the number of self-terminating deposition pulses. The ultrathin films match or exceed the best reported activity metrics for hydrogen oxidation in alkaline media and water splitting in acid.

Status of Availability

This invention is available for licensing exclusively or non-exclusively in any field of use.

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